

# Revision of the Chilopoda of New Zealand.

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## Part 1. (1936)

Introduction.

Order Geophilomorpha.

Order Scolopendromorpha.

Order Craterostigmomorpha.

## Part 2. (1937)

Order Lithobiomorpha.

Order Scutigleromorpha.

Conclusion.

This paper comprises for the most part a systematic study of the Chilopoda of New Zealand. Since the first studies of Newport in 1844 no less than 64 species of New Zealand chilopods have been named; but the present study, instead of adding a number of species to the list (only one new species is described) has reduced the number to thirty-seven.

This reduction has resulted from the examination of very many specimens of several of the species (of over 300 specimens in one case) which, with a careful scrutiny of the characters hitherto generally relied upon to distinguish species, has shown that such differences as have been noted fall well within the normal variation of widely distributed species. These variations are now found to be definitely related to increased size (and presumed greater age) of specimens, to their sex, and also to the degree of humidity of their environment. Observations on such variability are noted throughout the systematic section of the paper, at the end of which they will be discussed briefly, and the paper will be concluded with a review of the geographical relationships of the New Zealand Chilopod fauna.

This study was made possible by means of a research grant for collecting expenses and the purchase of equipment from the Royal Society of New Zealand. The types of all New Zealand species described by the writer in this and in previous papers are in the Canterbury Museum.

## Order GEOPHILOMORPHA.

Only two of the ten families of Geophilomorpha occur in New Zealand, the Schendylidae and the Geophilidae, the latter being represented by twelve species and the former by only one. The key which follows will serve to distinguish these families and their sub-families, and to indicate the systematic position of the New Zealand species.

*Key to families and sub-families occurring in New Zealand, and list of species.*

- I. Mandible with one dentate and only one pectinate lamellae ..... Fam. Schendylidae  
 Sub-fam. Ballophilinae  
*Ballophilus hounselli* n. sp.
- II. Mandible with no dentate and only one pectinate lamella ..... Fam. Geophilidae
1. No clypeal area present. Pleuro-coxal suture runs obliquely to lateral margin of head ..... Sub-fam. Geophilinae  
*Geophilus spenceri* (Pocock)  
*Geophilus zygethus* (Chamberlin)  
*Geophilus xylophagus* Attems  
*Zelanophilus provocator* (Pocock)  
*Zelanophilus ferrugineus* (Hutton)
2. A more lightly chitinised clypeal area present. Pleuro-coxal suture runs parallel with the head.
- (a) Coxae of second maxillae without long thickened edge; the gland opening surrounded by a thickened ring (Pl. 14, fig. 1) . . . . Sub-fam. Pachymerinae  
*Zelanion dux* Chamberlin  
*Zelanion antipodus* (Pocock)  
*Zelanion morbosus* (Hutton)  
*Maoriella aucklandica* Attems  
*Maoriella macrostigma* Attems  
*Maoriella zelanicus* (Chamberlin)
- (b) Coxae of second maxillae with a long thickened edge beside the gland opening (Pl. 15, fig. 8).  
 Sub-fam. Chilenophilinae  
*Schizoribautia brittini* Archey

**FAMILY SCHENDYLIDAE.**

**SUB-FAMILY BALLOPHILINAE.**

Genus **BALLOPHILUS** Cook 1895.

- 1895 *Ballophilus* Cook. Proc. U.S. Nat. Mus., V. 18, No. 1039, p. 70 (without any diagnosis, only the name quoted. Type, by original designation, *B. clavicornis* Cook, *nomen nudum!*)
- 1899 *Ballophilus* Cook. Proc. Ent. Soc. Washington, V. 4, p. 306.

Body segments 45 to 75. Mandible with a 4-toothed dentate, and one pectinate lamella. Prosternum of prehensors without chitinous lines; the pleurae, but not the telopod, partly visible from above. Ventral pore areas present in all but the first and

some of the hinder sternites. Coxopleure with one or two pore pits in a weakly chitinised depressed area alongside the sternal margin. Anal leg more or less strongly thickened, clawless.

**Ballophilus hounselli**, n. sp. Pl. 11, figs. 1-3.

Segments 53-71, increasing generally in accordance with the length of specimens from 16 to 40 mm. Length up to 40 mm. Internal coloration deep purple.

Body widest at two thirds the length from the head, tapering anteriorly to less than half the greatest width at the second segment, widening again slightly towards and including the head; posteriorly tapering less strongly.

Head (Pl. 11, fig. 2) almost semi-circular, slightly wider than long, caudal margin slightly convex. Prebasal plate visible, more so at sides. Basal plate broad, strongly convex, narrowing caudad. Antennae club-shaped, the segments enlarging beyond the eighth to the eleventh, the last segment longer than the two preceding together, ninth segment with sense rods.

Tergites, first to 14th smooth, with a median, triangular, weakly chitinised area on anterior margin, behind 15th with small irregular elevations and depressions, with long setae rising from the elevations. Anal tergite slightly wider than long, anterior margin straight, sides and hinder edge merging into one semi-circular postero-lateral margin. Spiracles circular.

Labrum weakly chitinised, serrate. Dental lamellae of mandible with eight teeth. First maxillae (fig. 3) with coxae fused, no suture; rami discrete, the outer, which is very indefinitely bipartite, being the larger; no lappets. Coxae of second maxillae with a median suture; palp tripartite; claw scoop-like with a minute pubescent fringe. Prehensors (fig. 3) unarmed, much wider than long, anterior margin deeply excavate; claw not reaching the front margin of the head.

Sternites: That of the first leg-bearing segment (fig. 3) triangular, remainder sub-quadrate, longer than wide. Anal sternite (fig. 1) wider than long, almost semi-circular, anterior margin straight. Ventral pores present in a raised dumb-bell shaped transverse area across hinder half of segments from the second to the fifth from posterior end, the areas becoming progressively smaller from the fortieth sternite caudad.

Coxopleurae (fig. 1) expanded, with numerous setae, also with a medio-posterior slightly raised pad with slightly more numerous hairs; each coxopleure with two dark pore pits on a less strongly chitinised depressed area alongside sternal margin. Anal pores not detected.

Legs slender with long setae, the first equal in size to the others. Anal legs much expanded, with six joints beyond coxopleure, of which the first is much shorter than wide, the remainder about as wide as long.

This species stands near to *B. australiae* Chamberlin, from which it differs in possessing fewer legs, in its darker colour and in the absence of ventral pores from the hinder sternites. It occurs in both islands of New Zealand; but is not common.

*Localities:* North Island: Kerikeri, Kaukapakapa, Waitakere Hills, St. Heliers, Brookby, Port Waikato, Kawhia. South Island: Waipara, Cashmere Hills, Akaroa, Otekaike.

*Key to South Pacific and Australian Species of  
Ballophilus.*

1. Prebasal plate not present . . . . *B. paucipes* Chamb. (Fiji)
2. Prebasal plate distinctly exposed.
  - a. Labrum definitely serrate—
    - i. Ventral pores extending from 2nd to penult segment. Anal pores present.  
*B. australiae* Chamb. (Australia)
    - ii. Ventral pores extending from 2nd segment to fifth from end. Anal pores absent . . . . *B. hounselli*, n. sp. (New Zealand)
  - b. Labrum with a few weak serrations, in large part appearing smooth.  
*B. fijiensis* Chamb. (Fiji)

*Ballophilus hounselli* shares with *B. rouxi* and *B. allaudi* the absence of ventral pores from the last four sternites; but differs from those species in being violet in internal coloration. (cf. Attems 1928, p. 140, Key to the Species of *Ballophilus*.)

## FAMILY GEOPHILIDAE.

### SUB-FAMILY GEOPHILINAE.

*Key to N.Z. genera.*

Prosternum of prehensors with chitinous lines

*Geophilus* Leach

Prosternum of prehensors without chitinous lines

*Zelanophilus* Chamberlin

### Genus GEOPHILUS Leach, 1814.

1814 Leach, Brewster's Edin. Encycl. VII. (2), p. 409 (*teste* Sherborn, Index Animalium).

1815 Leach, Trans. Zool. Soc. Lond., vol. II., p. 384.

1920 *Pachymerellus* Chamberlin, Bull. Mus. Comp. Zool., vol. 64, p. 51 (type, *P. zygethus* Chamb.).

Type: (by subsequent designation, Pocock, Ann. Mag. Nat. Hist., ser. 7, vol. 8, p. 330, 1901) *G. subterraneus* Leach.

Body usually narrowed anteriorly, head short and broad.

Clypeal area absent. Labrum tripartite, lateral pieces fringed, median piece small, dentate. Mandible with a single pectinate lamella, without dentate lamellae.

First maxillae with coxae united, coxae and outer ramus with or without lappets; coxae of second maxillae also completely or almost completely fused, without, or with incomplete, median suture. Prehensors with chitinous lines.

Sternal pores present. Coxopleurae with normal separate chitinised pores, distributed over surface or opening close together into a depression.

*Key to New Zealand Species.*

- A. Coxopleural pores each opening separately on coxopleural surface, first maxillae with lappets.
1. Segments, 39; coxopleural pores few, large, with a few on upper as well as on lower surface
    1. *G. spenceri* (Pocock)
  2. Segments 47-65; coxopleural pores more numerous both above and below.
    2. *G. zygethus* (Chamberlin)
- B. Coxopleural pores several, opening into a depression in coxopleure at edge of anal sternite; first maxillae without lappets; segments 61.
  3. *G. xylophagus* Attems

***Geophilus spenceri*** (Pocock), 1901. Pl. 11, figs. 4-7, Pl. 12, fig. 1.

*Necrophlocophagus spenceri*; Pocock, Ann. Mag. Nat. Hist., ser. 7, vol. 8, pp. 462-3, 1901. *Geophilus* (?) *spenceri*, Chamberlin, Bull. Mus. Comp. Zool., Harvard, vol. 64, p. 54, 1920.

Segments, 39. Length, 23 mm.

Head (Pl. 11, fig. 4) anterior margin rounded, merging into the very convex sides, postero-lateral angles rounded, caudal margin slightly emarginate; frontal sulcus not seen. Antennae filiform, slightly tapering distad, last article as long as two preceding taken together. Prebasal plate not visible. Basal plate very wide, wider than the head, and nearly as wide as first tergite, sides widely diverging caudad; slightly overlapped in front and behind.

Clypeal area absent. Labrum (fig. 7) tripartite, lateral pieces fringed, median with several distinct teeth. First maxillae (fig. 6) with coxae entire, rami discrete; coxae and first joint of outer ramus with distinct lappets. Second maxillae with coxae mesally fused, palp with long curved claw.

Prehensors (fig. 5): Prosternum short, broad, sides convex, merging with rounded caudal margin; seen from above it extends considerably beyond head laterally; chitinous lines present; anterior margin chitinised and medianly notched, but without teeth. Femuroid and claw armed with a low blunt tubercle, claw long, curved and stout, reaching to front margin of head.

Sternites. A deep oval median depression on the anterior fifteen segments which also have a triangular median process projecting from the caudal margin; this, when the body is contracted, fits under anterior margin of succeeding sternite; the anterior margin slightly raised medianly and with sub-lateral notch on each side of the raised portion. Ventral pores loosely scattered in a transverse band in hinder portion of all segments, becoming progressively fewer and smaller after the 29th. Anal sternite (Pl. 12, fig. 1) of moderate width, the convex sides slightly converging towards broadly rounded caudal margin; with numerous fine hairs in  $\delta$ . Anal pores present.

Coxopleure (Pl. 12, fig. 1) large, with numerous long fine hairs caudad; pores large, evenly spaced, 12 to 14 large pores below and 4 above. Anal legs in  $\delta$  very broad and thick, the joints wider than long; a few long hairs above, a dense pubescence of fine hairs below; six joints besides coxopleure, claw small.

Distribution: Pocock's type was from The Bluff (Baldwin Spencer) and I have collected specimens there also. The species has not been found elsewhere.

## 2. *Geophilus zygethus* (Chamberlin), 1920. Pl. 12, figs. 2-6.

*Pachymerellus zygethus* Chamberlin, Bull. Mus. Comp. Zool., vol. 64, p. 52, 1920.

Segments, 47-65. Length, 33 mm.

Head (Pl. 12, fig. 2) less wide than general body width, slightly longer than wide, sides convex, converging slightly anteriorly, postero-lateral angles rounded, hinder margin slightly emarginate. Antennae short, setae long on basal segments, becoming shorter and more numerous distad. Prebasal plate sometimes visible, sometimes covered. Basal plate usually completely uncovered, broad, sides diverging caudad to nearly full width of first tergite.

Anterior tergites with a pair of submedian shallow depressions. Anal tergite longer than wide, sides straight, converging slightly caudad, caudal margin straight, angles slightly rounded.

Clypeal area absent. Labrum (fig. 4) tripartite, median piece large and strongly chitinised, with from 10 to 12 long narrow teeth; lateral pieces strongly pectinate.

First maxillae (fig. 5) coxosternum, with a membranous lappet at each antero-ectal corner; rami discrete, the outer biarticulate its basal joint without or with only a rudimentary lappet. Second maxillae (fig. 5) with an incomplete median suture; claw of palp simple (in paratype from Tasmania and in New Zealand specimens).

Prehensors (fig. 3): prosternum slightly (1.25 times) wider than long, sides converging and strongly convex, merging into well rounded caudal margin; chitinous lines present; anterior margin unarmed, medianly notched. Femuroid with slight

tubercle; second and third joints unarmed; claw with blunt basal tubercle. Femuroid and claw short and stout, the former just visible from dorsal aspect, the claw falling short of anterior margin of head.

Sternites quadrate, the anterior ones wider than long, with a deep elliptical depression in front of middle and a scattered band of ventral pores across hinder end. Caudal margin with a median cone-shaped process, anterior margin with a corresponding raised median portion; intercalary sternites separated medianly. Anal sternite slightly wider than long, sides straight, converging, angles blunted, caudal margin straight. Anal pores present; gonopods of ♀ (fig. 6) projecting considerably more than in other species, while ♂ gonopods are long narrow styles.

Coxopleurae (fig. 6) large, three times as long as anal sternite, below with 20 to 30 pores, of which the anterior ones are smaller and closer together; above with about 12 pores, mostly clustered near the edge of the anal tergite. Anal legs in ♀ slender with long setae, with six joints and moderately large claw beyond coxopleure; in ♂ the joints are short and broad, with numerous fine setae; but much less wide than in *G. spenceri*.

Distribution: This species is known in New Zealand only from the South Island—Nelson, Akaroa, Otarama, Mt. Algidus, Dunedin and Mt. Dick (Lake Wakatipu). The type locality is "Tasmania."

This species was described by Chamberlin as the type of a new genus *Pachymerellus*. The characters in which the genus differs from *Geophilus* were not definitely stated, but the following details were recorded: "Second maxillae . . . coxae not completely fused at middle, a suture evident," and "Ventral pores lacking."

The Director of the Museum of Comparative Zoology has kindly lent me the two paratypes of *Pachymerellus zygethus* for examination, and I have been able to identify my New Zealand specimens with them. I find that, in the smaller of the paratypes, a much contracted specimen, the ventral pores are not visible; but in the larger paratype, which is rather more extended (though not so much extended as to show the posterior conical processes as clearly as in some of the more extended New Zealand specimens) they are clearly present, scattered across the hinder margin of the anterior (1st to 24th) sternites as in the New Zealand specimens.

With regard to the coxae of the second maxillae, it is not clear from Chamberlin's description whether the suture is complete, and completely separates the paired coxal elements. I have not dissected the paratypes lent to me, but preparations from two New Zealand specimens show clearly (fig. 5) that this coxal suture is incomplete and only partially separates the coxae.

There is no sign of a suture in either *Geophilus xylophagus* Att. or *G. spenceri* Poc., and as *Pachymerellus zygethus* is so obviously closely related to these species, I am constrained to regard

the incomplete coxal suture of the second maxillae as insufficient basis for the establishment of a new genus. *Pachymerellus zygethus* is therefore included here under the genus *Geophilus*.

3. ***Geophilus xylophagus*** Attems, 1903. Pl. 12, fig. 7.

*Geophilus xylophagus* Attems, Zool. Jahrb. Syst., 18, p. 237, 1903.

Segments, 61-67. Length, 37 mm.

Head small, anteriorly narrowed and rounded, posteriorly straight or slightly emarginate, i.e., sub-cordate; a frontal depression in front of which head is lighter in colour. Antennae increasing slightly in thickness distad, proximal segments longer and with scattered moderately long, slender hairs giving place distally to shorter, slightly thicker segments with increasing short pubescence. Prebasal plate just visible. Basal plate very broad, as broad as 1st tergite, the prehensors therefore only slightly visible from above.

Tergites with slight submedian lightly chitinised depressions, in which the polygonal facetting of the chitin is more spaced. Anal tergite broad anteriorly, sides strongly converging caudad and very slightly convex, hinder margin straight, angles scarcely rounded.

Prehensors: Prosternum short and broad, anteriorly truncate; unarmed; chitinous lines present. Telopod joints short and broad, unarmed; claw darker, strongly curved, sometimes with a small basal tooth, not reaching front of head when closed.

Sternites sub-quadrate, the anterior ones even slightly longer than wide. From the hinder end a broad cone-shaped projection springs, displacing the wedge-shaped intercalary sternites to the sides, and in some cases being inserted under the anterior margin of the next following sternite; from about the 20th segment this process disappears and the intercalary sternites meet medianly. In the posterior sternites the anterior margin projects somewhat forward in a broadly obtuse angle, and the intercalary sternites again become wedge-shaped; oval median depressions present, deep on anterior segments, shallower on middle ones. Ventral pores present in a large oval area in posterior half of sternites, this becoming divided into two submedian areas after about the 24th sternite. Anal sternite (Pl. 12, fig. 7) broad, anteriorly only slightly less wide than the preceding sternite, sides straight, strongly converging caudad, hinder margin straight.

Coxopleural pores (Pl. 12, fig. 7) 6-12, opening separately into a deep pit under edge of anal sternite. Anal legs in ♂ with short thick segments covered with numerous short setae, terminal claw small; in ♀ the anal legs are slender, with few setae.

Distribution: The type locality is "New Zealand, in decaying wood, Reischek." My own collecting shows it to be a coastal species, found on the sandhills in both Islands, i.e., Ahipara, Whangarei, Muriwai, Whatipu, Coromandel; New Brighton, Sumner and Stewart Island.



## Genus ZELANOPHILUS Chamberlin, 1920.

1920 Bull. Mus. Comp. Zool. Harvard, vol. 64, No. 1, p. 50.

Type (by original designation): *Zelanophilus wheeleri* Chamberlin (synonym of *Z. provocator*, Pocock).

Clypeal area absent. Labrum (Pl. 13, figs. 4, 6) tripartite, median piece small, armed with three to twelve strong teeth, lateral pieces fringed with long setae. First maxillae (fig. 5) with coxae completely chitinised, no suture, no lappets; rami discrete, also without lappets, outer division biarticulate, the second article much the longer; both rami with numerous long setae. Second maxillae (fig. 5) coxae short, completely chitinised, no dividing suture, pore not enclosed mesally; palp with long setae increasingly numerous on second and third joints and especially crowded over and obscuring short claw.

Prehensors stout, prosternum without chitinous lines and unarmed, medianly notched; femuroid with a blunt tubercle distad, other joints and claw unarmed, not extending beyond head when closed.

Sternites with ventral pores in transverse band, anal sternite narrow, coxopleural pores numerous; anal leg with claw.

New Zealand only.

*Key to species.*

1. Segments 67-77, laterals of labrum with single fringe of setae, and under-surface of head with only moderate number of setae.
  1. *Z. provocator* (Pocock).
2. Segments 109, laterals of labrum with 3 or 4 rows of setae; under-surface of head with numerous setae ..... *Z. ferrugineus* (Hutton).

1. *Zelanophilus provocator* (Pocock), 1891. Pl. 13, figs. 1-5.

*Geophilus provocator* Pocock, Ann. Mag. Nat. Hist., ser. 6, vol. 8, p. 225, pl. 12, figs. 10, 10a, 10b, 1891. *Zelanophilus wheeleri* Chamberlin, Bull. Mus. Comp. Zool., Harvard, vol. 64, No. 1, p. 50, 1920. *Z. kapiti* Archey, Rec. Cant. Mus., vol. 2, p. 73, pl. 13, figs. 1-1b, 1922.

Segments 67-77, 69 in type. Length, females up to 75 mm., males up to 53 mm.

Head (Pl. 13, fig. 1) slightly longer than wide, anterior margin and sides slightly convex, caudal margin straight or slightly emarginate, angles rounded; frontal sulcus distinct. Antennae long, attenuated, proximally with moderate-sized setae, increasing in number and fineness distally, last segment barely longer than penultimate. Prebasal plate invisible. Basal plate trapeziform, a little narrower than first tergite, more than twice as wide

as long. Labrum (fig. 4) with median piece armed with from three to nine teeth, the smaller number in small specimens; the lateral pieces with a single fringe of long setae.

Tergites, except the anterior and posterior ones, bisulcate and with a slight median impression. Anal tergite very narrow, nearly twice as long as broad, its sides slightly convex and very slightly converging, not nearly covering the coxopleure.

Prehensors (fig. 3) wider than long, without chitinous lines, anterior margin chitinised and medianly notched; femuroid with a round tubercle distally, other joints unarmed; claw long, dark and strongly curved, reaching when closed to front of head. First pair of legs much smaller than second.

Sternites with a median oval depression; ventral pores in a transverse elliptical band behind middle. Anal sternite (fig. 2) long and narrow.

Coxopleurae (fig. 2) large, from above seen to extend to hinder margin of penultimate tergite with numerous pores above and below which are smaller and more numerous towards margin of anal sternite. Last legs with six joints and claw beyond the coxopleure, the joints of moderate width, covered with numerous fine setae. Anal pores small.

Distribution: South Island generally, where it is a common species, but not yet known from Westland; in the North Island it is known only from Wellington, Kapiti Island and Taranaki.

I am indebted to Dr. Susan Finegan for a detailed description and drawings of the type of this species in the British Museum, and to Dr. T. Barbour, Director of the Museum of Comparative Zoology, for lending me the paratypes of *Z. wheeleri* for examination. Females of this species are more numerous than males and attain a larger size. There is less diversity between the sexes in the thickness and pubescence of the anal leg in this species than in the species of other New Zealand genera.

*Zelanophilus kapiti* Archey, formerly separated on account of the smaller number (3) of median labral teeth and the absence of the median tergal depression, is united to *Z. provocator*, as the characters concerned have now been found to vary in accordance with the size of specimens, smaller specimens having fewer labral teeth and sulci less strongly impressed or even absent.

## 2. *Zelanophilus ferrugineus* (Hutton), 1877. Pl. 13, figs. 6-8.

*Himantarium ferrugineum* Hutton, Ann. Mag. Nat. Hist., ser. 4, vol. 20, p. 115, 1877. *Himantarium ferrugineus* Hutton, Trans. N.Z. Inst., vol. 10, p. 289, fig. 1, 1878. *Geophilus huttoni* Pocock, Ann. Mag. Nat. Hist., ser. 6, vol. 8, p. 223, 1891. *Megethmus huttoni*, Attems, Zool. Jahrb. Syst., vol. 18, p. 214, 1903. *Megethmus ferrugineus* Chamberlin, Bull. Mus. Comp. Zool., vol. 64, p. 63, 1920.

Segments, 109. Length, 120 mm.

Head as in *Z. provocator*, frontal sulcus distinct, moderately with setae, under-surface with numerous long setae. Basal plate also wide as in *Z. provocator*. Labrum (Pl. 13, fig. 6) with three or four rows of setae on laterals.

Tergites, except those at end, bisulcate. Anal tergite (fig. 8) much narrower than preceding, longer than wide, sides subparallel, slightly convex.

Sternites with a slight median depression. Ventral pores numerous in a transverse elliptical area across hinder portion of sternite, incompletely divided in hinder segments into two submedian areas. Anal sternite (fig. 7) much smaller than the others, long and narrow, sides slightly converging caudad.

Coxopleure (figs. 7 and 8) much enlarged, four times the size of anal sternite; seen from above it extends forward to half-way along the sides of the tergite of preceding segment; pores numerous, small, covering the whole of dorsal and ventral surfaces. Anal pores very small.

This species differs from *Z. provocator* in its greater number of segments, the more abundant setae on labrum and under surface of head, and in the much expanded coxopleure, with its more numerous and smaller pores. Hutton's specimens were from Wellington and Inchclutha (Otago), and Pocock's specimen was from Wellington. I have had for examination only one much damaged specimen, without locality, which had been labelled *Geophilus huttoni* in Captain Hutton's handwriting.

## Sub-Family 2. PACHYMERINAE.

### *Key to N.Z. Genera.*

- Coxal glands of last leg each opening separately,  
the openings being separate chitinised  
pores scattered over coxopleure. Sternal  
pores very rarely present . . . . . *Zelanion* Chamberlin
- Coxal glands with two or three large group-openings  
lying near edge of anal sternite; sternal  
pores present . . . . . *Maoriella* Attems

### Genus ZELANION Chamberlin, 1920.

- 1920 Bull. Mus. Comp. Zool. 64, p. 39. Type, by original designation, *Z. dux* Chamberlin.
- 1920 *Pachymeroides* Chamb., Bull. Mus. Comp. Zool. 64, p. 45.  
Type, *P. mimeticus* Chamb.

Clypeal area present, marked by polygonal facets much smaller than those of the surrounding area. Labrum (Pl. 14, fig. 8) tripartite, the median piece small with few teeth (three in genotype), the lateral pieces slender, fringed.

First maxillae (Pl. 14, fig. 1) coxae entire, without lappets, rami discrete, the outer biarticulate its first joint with a very long lappet.

Second maxillae: coxae with a faint median suture through the narrow membranous isthmus which joins them; claw of palp long, straight, smooth.

Prehensors: prosternum armed anteriorly, without chitinous lines; femuroid and claw armed, prehensors extending much beyond the cephalic plate.

Sternal pores usually absent, when present a few scattered pores on at most the first to eighth segments.

Coxopleural pores numerous or few, small and large below, and in some species a few above also; anal legs with claw.

*Zelanion* stands near to *Eurytion* Attems, from which it may be distinguished by its possession of a clypeal area with fine, but distinct, polygonal facetting. In *Eurytion* the clypeal area is described as granular.

Another related genus or subgenus is *Steneurytion* Attems (1909. Jena Denksch. Med. Ges. 14, p. 28). The reference is not available in New Zealand, and the Zoological Record does not state what is the type species; it is, however, presumably a South African species, because the genus was designated in a paper on South African chilopods.

The subgenus appears, however, to have been subsequently suppressed by Attems, who in "The Myriapoda of South Africa" (Annals of the South African Museum, vol. 26) does not include it in his account of the species of *Eurytion*. From the fact that in Attems' Key to the Species of *Eurytion* (pp. 161-2) the primary division is the regular possession of a sternal pore-area, as against the presence, in older specimens only, of a few scattered pores on the anterior segments, and the further fact that *E. incisungius*, previously referred by Attems to *Steneurytion*, is now included in his key in the latter group, I infer that the distinguishing characters of *Steneurytion* was the absence of sternal pores.

This point will be referred to below in discussing the relationship of *Zelanion dux*.

Key to Species of ZELANION.

- A. Anal sternite long and narrow, coxopleural pores numerous.
1. Segments 49-51 .....: 1. *Z. dux* Chamberlin.
  2. Segments 39-41 ..... 2. *Z. antipodus* (Pocock).
- B. Anal sternite broad, coxopleural pores few, lying under edge of sternite. . . 3. *Z. morbosus* (Hutton).

1. *Zelanion dux* Chamberlin, 1920. Pl. 14, figs. 1-4.

*Zelanion dux* Chamberlin, Bull. Mus. Comp. Zool., 64, p. 39, 1920.

*Pachymerium schauinslandi* Attems, (part) Zool. Jahrb. Syst., vol. 18, p. 251, 1903.

Segments, 49-53. Length, up to 44 mm. Head (Pl. 14, fig. 3) 1.5 as long as broad, anterior margin medianly slightly emarginate, sides slightly convex, postero-lateral angles moderately rounded, hinder margin straight. Prebasal plate not visible; basal plate trapeziform, posterior margin 1.7 as long as anterior.

Clypeal area present (fig. 2) consisting of numerous very small polygonal facets. Labrum with long, slender, fringed lateral pieces and small median piece with three teeth.

Prehensors (fig. 2): prosternum 1.1 times as wide as long, without chitinous lines, also with a narrow median depression; anteriorly with two conical teeth; femuroid with a round blunt tooth of moderate size sub-distad, trochantal sulcus present, second and third joints unarmed, claw basally with a larger tooth than that of femuroid; claws long, curved, and reaching when closed to the end of the first antennal joint.

Sternites without ventral pores, anterior and posterior sternites with a median sulcus; anal sternite narrower, considerably longer than wide, with sides converging caudad and hinder margin slightly convex.

Coxopleure (fig. 4) nearly twice as long as anal sternite, with numerous small and moderate sized pores below (some under edge of sternite) and a few above anteriorly; a few scattered hairs between the pores with, in the males, a moderately dense pubescence on medio-caudal margin; anal legs in female long and slender, with scattered long hairs, in male the segments are much shorter and thicker, with a moderately dense pubescence, claws small.

Distribution: North Island generally, and Nelson and Westland only in the South Island.

The inclusion of *Pachymerium schauinslandi* Attems (part) in the synonymy of this species is due to the fact that Attems' description of *P. schauinslandi* includes details from two specimens, one first mentioned, from Chatham Islands, with 39 segments, and another, from Stephen Island, with 53 segments. The Chatham Island specimens I have previously (Rec. Cant. Mus., vol. 3, p. 40, 1926) identified with *Z. librius* Chamb. (= *Z. antipodus* Pocock), while the Stephen Island specimen is referable to *Zelanion dux*.

The only character which separates this species from *Eurytion* (*Steneurytion*) *incisunguis* Attems is the presence in it of fine polygonal facetting on the clypeal area, which in *E. incisunguis* is described as granular or finely punctured. Attems also describes this condition in his *E. sitocola* from New Zealand [= *Zelanion antipodus* (Pocock)]; but the hundreds of specimens of

*Z. antipodus* I have examined all have fine polygonal faceting. Attems has identified an Australian specimen as *E. sitocola* (Attems, 1911, p. 161), and I have identified Australian specimens with *Zelanian antipodus*; and I should be quite prepared to find that, just as the 39-segmented *Z. antipodus* is found in Australia and New Zealand, so also may be the 51-segmented *Z. dux*, which would then require to be referred to under the name *Z. incisunguis* (Attems).

Attems (1911, p. 160) described *E. incisunguis* as lacking ventral pores, but, in his Key (1928, p. 171) included it among those which sometimes develop ventral pores. I have never found ventral pores in *Z. dux*, even in large specimens; but they are sometimes present in older individuals of *Z. antipodus*, the next species to be described.

## 2. *Zelanian antipodus* (Pocock), 1891. Pl. 14, figs. 5-8.

*Geophilus antipodum* Pocock, Ann. Mag. Nat. Hist., ser. 6, vol. 8, p. 222, pl. 12, fig. 8, 1891. *Necrophloeophagus antipodum* Pocock, Ann. Mag. Nat. Hist., ser. 7, vol. 8, p. 461, 1901. *Geophilus (Pachymerium) schauinslandi* Attems (part) Zool. Jahrb. Syst., 18, p. 251, 1903. *Geophilus (Pachymerium) sitocola* Attems, Zool. Jahrb. Syst., 18, p. 256, 1903. *Eurytion sitocola* Attems, Fauna Sudw. Austr. 3. p. 161, 1911. *Zelanian librius* Chamberlin, Bull. Mus. Comp. Zool. 64, p. 40, 1920. *Zelanian curtus* Chamberlin, ibid. p. 41, 1920. *Pachymeroides mimeticus* Chamberlin, ibid. p. 45, 1920. *Zelanian librius*, Archey, Rec. Cant. Mus., vol. 3, pt. 1, p. 40, pl. 7, figs. 1-3, 1926. See also p. 41, note on *Pachymerium schauinslandi*.

Segments 37-41, commonly 39. Head (Pl. 14, fig. 5) longer and narrower than in *Z. dux* (1.7 times as long as wide) and more strongly narrowed caudad; prehensors extending well beyond its lateral margins; anterior border straight with median emargination, frontal sulcus faintly marked in large specimens. Basal plate trapeziform, a little narrower than in *Z. dux*; Prehensors (fig. 7) as in *Z. dux*, claw curved and reaching when closed to end of first antennal segment. First legs slightly shorter and more slender than the second.

Sternites: The previous descriptions of this species and of its synonyms have all recorded the absence of sternal pores; they are, however, present but are few and scattered, on the hinder portion of segments 1-9 in large specimens, and of segments 1-5 in small (16 mm.) specimens. They could not be seen on a specimen 8 mm. long. In segments 1-3 there are also groups on intercalary sternites. Anal sternite (fig. 6) long and narrow, sides straight converging caudad, caudal margin slightly convex.

Coxopleure 1.5 as long as anal sternite and with several moderate sized pores on ventral but not on dorsal surface. Anal legs in male and female as in *Z. dux*, anal pores present.

Distribution: Common in both islands generally, Stewart Island and Chatham Islands; also southern portions of Australia, i.e., Victoria, Tasmania and south-western corner of Western Australia.

I have been able to identify this species, and unite with it those mentioned in the synonymy, through the kindness of Dr. Susan Finegan, of the British Museum (Natural History) in providing me with a detailed description and figures of the type of *Geophilus antipodum* Pocock. I have also examined several hundred specimens from all parts of New Zealand, including the Chatham Islands, as well as several from Australia, and have found that the differences which have been relied upon to distinguish the species herein regarded as synonyms fall within the range of variation of the species and are usually associated with growth stages. This is by far the commonest New Zealand geophilid and occurs in the bush and under logs in partly cleared country in all parts of the Dominion.

I have also had for comparison the paratype of *Pachymeroides mimeticus* Chamb. and some other specimens from Tasmania (Mt. Wellington) and I am unable to detect any constant differences between them and the many New Zealand specimens of *Z. antipodum* which I have examined. Moreover, a comparison of the generic descriptions of *Zelanion* and *Pachymeroides* and of the specific descriptions of *Z. librius* and *P. mimeticus* does not reveal any significant difference between them, and I am, therefore, compelled to unite them.

*Pachymeroides alter* Chamb. is included as a synonym of the next species.

### 3. *Zelanion morbosus* (Hutton), 1877. Pl. 14, fig. 9.

*Himantarium morbosum* Hutton, Ann. Mag. Nat. Hist., ser. 4, vol. 20, p. 115, 1877. *Geophilus morbosus* Pocock, Ann. Mag. Nat. Hist., ser. 6, vol. 8, p. 221, pl. 12, 1891. *Zelanion (Zelanoides) similis* Chamberlin, Bull. Mus. Comp. Zool. 64, p. 41, 1920. *Zelanion (Zelanoides) paucipes* Chamberlin, *ibid*, p. 42. *Pachymeroides alter* Chamberlin, *ibid*, p. 46.

Segments 39-41. Head 1.5 times longer than wide; frontal sulcus faintly but definitely marked, a few scattered hairs, still fewer on frontal region.

Basal plate: the degree of overlapping of this plate by the head varies according to the amount of contraction of individual specimens. I have specimens with the whole plate exposed and others with only a very narrow band.

Prehensors when closed reaching to the first antennal segment; prosternum anteriorly armed with two teeth which vary

somewhat in their angle of divergence from one another. Trochantal sulcus present; trochantal tooth a slight rounded black eminence; tooth of femuroid stouter than that of claw. First legs slightly shorter and more slender than the second.

Sternites with ventral pores as in *Z. antipodum*; last sternite (Pl. 14, fig. 9) broad, the sides straight, converging caudad and with caudal angles strongly rounded, caudal margin a little convex.

Coxopleural pores (fig. 9) small, few in number, lying along and beneath the border of the last ventral plate. Claw of last legs stout and well-developed.

This species is very similar to the preceding, differing in the much broader anal sternite and the reduced number of coxopleural pores.

Distribution: Parikanapa (Gisborne), Ohakune, New Plymouth, Kapiti Island; Stephen Island, North Canterbury, Mt. Algidus, Cass, Otarama, Banks Peninsula, and Otekaike (North Otago). Australia: Tasmania (Chamberlin) and Wilson's Promontory (G.A.).

The distribution of the three species of *Zelanon* is interesting. *Z. antipodus* is found abundantly over the whole of New Zealand from Spirits Bay to Stewart Island, and in the Chatham Islands, and is by far the commonest geophilid in the Region.

*Z. dux* is recorded from Norfolk Island, the North Island, and only from Nelson and Westland in the South Island, while *Z. morbosus* is recorded from the Wellington biological district, Stephen Island and the Canterbury-Otago District, and is rare in the district (Wellington) which it shares with *Z. dux*.

It would appear that the reduced size and smaller number of coxopleural pores of *Z. morbosus* are related to the drier climate of the Canterbury-Otago District, while the larger size and more numerous coxopleural pores of *Z. dux* are associated with the more humid climate of Westland and the western North Island. I have previously (Records Canterbury Museum, vol. 2, p. 207) drawn attention to a similar increase in the number of coxopleural pores under moist climate conditions in species of *Cryptops* in New Zealand.

#### Genus MAORIELLA Attems, 1903.

- 1903 Zool. Jahrb. Syst. 18, p. 284. Type (herein designated)  
*M. macrostigma* Attems.
- 1920 *Mesoleptodon* Chamberlin, Bull. Mus. Comp. Zool. 64, p. 47.  
Type *M. laetus* Ch.
- 1920 *Philogeonus* Chamberlin, Bull. Mus. Comp. Zool. 64, p. 48.  
Type *P. zelanicus* Ch.

Clypeal area present as a clear space surrounded by polygonal facets. Labrum tripartite, the lateral pieces long, slender and fringed, the median very small.



Mandible with one pectinate lamella. Coxae of first maxillae (Pl. 15, fig. 4) completely fused, rami discrete, the outer with a fairly long lappet on first joint. Second maxillae (fig. 4) with coxae chitinised across isthmus, but with indistinct median suture, terminal claw long, narrow and straight.

Prehensors with anterior margin notched, the thicker chitinisation on each side of notch only just forming a low tooth; femuroid and claw armed.

Sternal pores present; coxopleure with two, rarely three, lobed gland groups each opening by a depression near edge of sternite.

*Key to Species of MAORIELLA.*

1. Leg-bearing segments 91 . . . . . 1. *M. aucklandica* Attems.
2. Leg-bearing segments 55-61.
  - i. Head, basal plate, prehensors and anal sternite broader; head 1.3 times as long as broad . . . . . 2. *M. macrostigma* Attems.
  - ii. Head, basal plate, prehensors and anal sternite narrower; head 1.5 times as long as broad . . . . . 3. *M. australis* n. sp. (Australia).
3. Leg-bearing segments 41-49 . . 4. *M. zelanicus* (Chamberlin).

1. *Maoriella aucklandica* Attems, 1903. Zool. Jahrb. Syst. 18, p. 285, 1903.

Segments 91. Length 90 mm. Colour brownish yellow.

Antennae narrowed distad, first 5 joints with sparse long hairs from 6th onward with shorter and thicker hairs with separate long hairs among them. Head longish, front straight, posteriorly emarginate, sides rounded, surface with fine sparse puncturing; frontal area separated by fine sulcus. Prebasal plate not visible. Basal plate rather broad, posteriorly nearly as broad as 2nd tergite, anteriorly narrowed. Tergites bisulcate, otherwise smooth.

First maxilla: basal joint of outer ramus with distinct lappet. Second maxilla claw as in *M. macrostigma*, straight and thin. Prehensors: prosternum without chitinous lines, anteriorly notched unarmed. Femuroid with small tubercle. Claw smooth within, strong, reaching beyond the front of the head. The whole visible for the most part from above.

Sternites with deep longitudinal sulcus, otherwise smooth. This sulcus remains poreless, and divides the large transverse pore-field (which is nearly as broad as the whole sternite) into two halves. Anal sternite very large, as broad as the whole preceding segment, straight behind, the corners rounded.

Coxopleure large, the glands in essentials as in *M. macrostigma*, the lobes into which the glands are divided are here

more numerous and smaller. The opening of the anterior gland group lies hidden wholly under the lateral edge of the sternite, the hinder one is for the greater part exposed. Anal pores divided, as in *macrostigma*, into many small lobules, as in the coxopleural pores. Last leg 7 jointed with claw.

Spiracles small. Athemschild small, prescutellum much larger than athemschild and postscutellum together.

Locality: Bay of Islands.

I have not seen specimens of this species, the above being a translation of Attems' description.

## 2. *Macriella macrostigma* Attems, 1903. Pl. 15, figs. 1-4.

*Maoriella macrostigma* Attems, Zool. Jahrb. Syst. 18, p. 284, pl. 14, fig. 26-28, 1903. *Mesoleptodon laetus*, Chamberlin, Bull. Mus. Comp. Zool. 64, p. 47, 1920.

Segments 55-61, commonly 61.

Head (Pl. 15, fig. 1) 1.2 to 1.6 times longer than broad, sides convex, anteriorly rounded, posteriorly slightly emarginate. Antennae: first four joints with scattered long hairs, 5th and subsequent joints with increasing number of short hairs and fewer long.

Prebasal plate not visible. Basal plate trapeziform, length one third of posterior width, anteriorly strongly narrowed; its greatest length is slightly less than the width of the second leg-bearing segment. Tergites bisulcate and with very few bristles. Anal tergite trapeziform, with slightly convex sides strongly converging caudad.

Clypeal area present, a clear space slightly granulated without chitinised polygonal facets. Labrum tripartite, lateral pieces long, slender and fringed, median piece very small. Mandible with one pectinate lamella. First maxillae (Pl. 15, fig. 4): Coxae fused, no suture, rami discrete, inwardly with long setae, outer bipartite with long slender lappet. Second maxillae (fig. 4): Coxae chitinised across isthmus, but with indistinct median suture, terminal claw long, narrow and straight.

Prehensors (fig. 2) varying in width apparently in accordance with the degree of muscular contraction of the animal, from 1.0 to 1.4 times as wide as long. Anterior margin notched medianly, the lateral portions of this margin being somewhat thickly chitinised inwardly, sometimes thereby forming two low blunt teeth. Prosternum with median depression, the sides converging caudad, latero-posterior margins broadly rounded; the posterior portion of the lateral edges with a narrow line of dark chitinisation. Femuroid with a tooth inwardly, base of claw with larger, sharp tooth; claw long, curved, reaching to front of head when closed.

Sternites wider than long, from the 1st to 25th with front margin straight, the hinder margin projecting slightly back to an obtuse-angled projection. From the 25th caudad the hinder margin is straight, the space between the inter-calary sternites being now filled by a low obtuse-angled projection of the front margin. A broad median sulcus present, better defined on the anterior sternites. The first sternite sub-elliptical, bounded antero-laterad by the triangular pro-coxa. Sternal pores present in elliptical area on the hinder portion of the sternite in the first twenty-five segments, thereafter divided into two sub-median areas. Anal sternite (fig. 3) almost semi-circular, width of anterior margin 1.4 of the length.

Coxopleural pores (fig. 3) in two pore-groups, rarely with a third at the anterior end of coxopleure, each opening by a wide depression with irregularly shaped chitinised margin at the edge of anal sternite. Anal legs with claw and 7 joints, including coxopleure; in female the joints long and slender, with scattered long hairs, in male the segments short and broad, densely clothed with short hairs.

Anal pores with wide sub-circular pore, into which lobed glands open.

Distribution: Both Islands. In the South Island it has only been collected at Stephen Island (Cook Strait) and Quail Island (Lyttelton Harbour). Although this species is found in hilly country inland, it is commoner near the coast, and sometimes occurs on the beaches below high water. It is the common garden centipede in Auckland.

### 3. *Maoriella zelanicus* (Chamberlin), 1920. Pl. 15, fig. 5.

*Philogeonus zelandicus* Chamberlin, Bull. Mus. Comp. Zool., vol. 54, p. 48, 1920.

Segments 41-49.

Head (Pl. 15, fig. 5) 1.2-1.37 as long as broad, generally broader in males. Antennae as in *M. macrostigma*. Prebasal plate, according to Chamberlin, "exposed at the middle"; but this occurs only in weakly chitinised specimens which are somewhat extended. Basal plate not as wide as in *M. macrostigma*.

Prehensors: the prosterum is usually rather wider than in *M. macrostigma*, i.e., from 1.23-1.64 times as wide as long; it is also slightly wider in males. Sternites as in *M. macrostigma*, the individual ventral pores, however, being smaller. Coxopleural pores and anal legs as in *M. macrostigma*.

This species differs from *M. macrostigma* only in the smaller number of segments, in the slightly wider prosterum of the prehensors, and the smaller sternal pores.

Dr. Nathan Banks has been kind enough to compare two of my specimens with the type of *Philogeonus zelanicus* Chamberlin in the Museum of Comparative Zoology.

The points of difference between *Maoriella* and *Philogeonus* are the absence from the latter of sternal pores and first maxillary lappets. Unfortunately, the head is at present missing from the type of *Philogeonus zelanicus* and the presence of lappets cannot be checked. Dr. Banks also finds the sternal pores very obscure, as I myself have also found them in young or weakly chitinized specimens. A difference in the thickness and hairiness of the legs noted by Dr. Banks is a sex-and-age character.

I have several examples of this species all with well-developed sternal pores, and am satisfied it should be included under *Maoriella*.

Distribution: Known only from the North Island: Lake Takapuna (type), Waipoua Forest, Hokianga, Maungaturoto, Port Waikato, Pirongia, New Plymouth, Taumarunui, Parikanapa (Poverty Bay).

#### Systematic Position of MAORIELLA.

The placing of *Maoriella* in the Pachymerinae instead of the Geophilinae may seem to be somewhat arbitrary. It is indeed difficult to decide to which group it has the closer affinities, because it occupies an intermediate position in respect to one of the characters by which these sub-families are distinguished, i.e., in the form of the head, which in *Geophilus* is short and broad with broadly rounded postero-lateral angles and with a curved oblique pleuro-coxal suture of the prehensors, but which in *Pachymerium* (and *Zelanion* in New Zealand) is long and narrow, with less rounded postero-lateral angles and a straight pleuro-coxal suture parallel to the side of the head. In conformity with the proportions of the head, *Geophilus* and *Zelanion* have the second maxillae short or long respectively; while in *Maoriella* it is of medium length.

The definite presence of a clypeal area in *Maoriella* is a character of the Pachymerinae. Attems, who includes *Maoriella* in the Geophilinae, does not mention its presence in his descriptions of the genus or its species; but I have now examined so many specimens and always found it present that I can only infer that it was obscured or overlooked when the original examination was made.

The labrum in *Maoriella* has a very small median piece, as in *Pachymerium* and *Eurytion*, but the size of the parts of the labrum is too variable to be used as a diagnostic character.

In all the Geophilinae except *Insigniporus* and *Pachymerellus* the coxae of the 2nd maxillae are united to form a syncoxa, while in all the Pachymerinae except *Pachymerium* and *Tasmanophilus* the coxae are divided by a suture (see Attems 1926, pp. 360-361) and the latter condition holds in *Maoriella*. But caution must be used in relying on this character, whose variability, as also that of the presence or absence of lappets, has already been referred to by Verhoeff (1925, p. 43).

Attems, indeed (1926, p. 361), had, unwittingly, experienced the difficulty of classifying *Maoriella* because, relying, of course, on the characters given in Chamberlin's diagnosis, he placed both *Mesoleptodon* Chamb. and *Philogeonus* Chamb. in the Pachymerinae; and, as I have shown, the types of both genera are species of *Maoriella*; indeed, *Mesoleptodon laetus* Ch. is *Maoriella macrostigma* Att.

In the unusual form of the coxopleural pores *Maoriella* is, of course, exceptional; but on the whole I am convinced that its affinities are more with the Pachymerinae than the Geophilinae.

I include here the description of a new species of *Maoriella* from Chillingollah, Victoria.

### *Maoriella australis*, n. sp.

Leg-bearing segments 55.

Head 1.5 times longer than wide, sides straight in the middle region, gently curved inwards at either end. No frontal sulcus.

Basal plate: length one half that of the hinder margin, sides narrowing strongly anteriorly, considerably narrower and more tapering than in *M. macrostigma*.

Anal tergite with anterior margin relatively as broad as in *M. macrostigma*, but much narrower at caudal margin.

Prosternum of prehensors narrower and more parallel-sided than in *M. macrostigma*; anterior sternites with a central pore-area which on the 18th begins to be divided by a median depression, there being two pore-areas from 22nd to 50th sternites.

Anal sternite broad and rounded posteriorly; anal legs (of male) with broad densely pubescent joints, neither sternite nor leg-segments, however, as broad as in male of *M. macrostigma*.

The two coxopleural pore-openings are smaller than in *M. macrostigma* and lie close together anteriorly on the coxopleure and under the edge of the anal sternite.

*M. australis* therefore differs from *M. macrostigma* in having a narrower head and prehensors, a narrower and more tapering basal plate and narrower anal sternite and anal leg segments (in the male).

Locality: Chillingollah, Victoria, C. French, Jnr., 27/9/1913. Type in the National Museum, Melbourne.

I have to thank the Director of the National Museum for giving me the opportunity of examining this and several other species of Australian chilopods.

### Sub-family CHILENOPHILINAE.

#### Genus SCHIZORIBAUTIA Broelemann, 1912.

- 1912 *Schizoribautia*, Broelemann, Rec. Australian Mus., vol. 9, p. 70. Type, by original designation, *S. rainbowi* Broelemann.

Clypeal area present. Median piece of labrum (Pl. 15, fig. 9) moderately small, unarmed or with a fringe either of delicate ramose lashes or of small teeth; lateral pieces fringed only on inner portions. First maxillae (fig. 8) with coxae undivided, rami discrete, the outer biarticulate; no lappets. Second maxillae (fig. 8) with coxosternum joined by a narrow isthmus, without a dividing suture; coxal, sternal and pleural plates distinct; antero-interior angle tipped with a conical process, small processes at anterior outer angles of one or more joints of palp; claw smooth.

Prehensors (fig. 7) with prosternum, femuroid and claw armed, chitinous lines present. Ventral pores present in small circular area behind middle of sternites. Coxopleural pores few, opening beside edge of anal sternite. Anal legs, coxae included, with seven joints and a small claw.

*Key to the Species of SCHIZORIBAUTIA.*

Median piece of labrum unarmed.

*S. rainbowi* Broelemann (N.S. Wales).

Median piece of labrum with a fringe of delicate ramose lashes.

*S. aggregatum* Broelemann (N.S. Wales).

Median piece of labrum armed with from 5 to 9

small teeth . . . . . *S. brittini* Archey (New Zealand).

There is another species, *S. unguiculata* Broel. (1926) from West Africa; but I have not been able to refer to the description.

**Schizoribautia brittini** Archey, 1922. Pl. 15, figs. 6-10.

Rec. Cant. Mus., vol. 2, pp. 73-76, figs. 1, 2 and 2a, 1922.

Segments 51-57, the number increasing according to length of the individual. Length from 17 to 31 mm.

Head (Pl. 15, fig. 6) longer than wide, front margin medianly notched; frontal area narrow but not marked off by a sulcus; sides sub-parallel, slightly convex; caudal margin straight, posterior hinder angles rounded, the surface coarsely punctuated. Seen from above the prehensors extend well beyond the head laterally and anteriorly. Antennae three times as long as head, joints twice as long as broad; last joint not quite as long as the two preceding ones together. First eight joints with a few long hairs, 9th with short and long hairs, the remainder pubescent. Basal plate trapeziform much covered by head.

Tergites bisulcate. Anal tergite trapeziform with sides slightly convex; caudal margin straight.

Clypeal area present, armed with 1-4 spines. Labrum (fig. 9) with median piece slightly more than one-third as long as laterals, armed with about 9-10 small teeth; laterals with a few

fringing hairs medianly. First maxillae (fig. 8) with biarticulate outer ramus, no lappets. Second maxillae with a process projecting from anterior mesal angle of coxae; first and second joints of palp with a small process at the outer distal angle; claw simple, long, straight.

Prehensors (fig. 7): prosternum with distinct chitinous lines fringed with short setae. Prosternum large subquadrate, coarsely punctured with two teeth anteriorly separated by a notch which leads to a broad furrow with thickened edges extending one-half to two-thirds the length of the coxae. Femuroid with three rounded tubercles (one trochantal); claw dark, strongly curved with a large dark tooth basally; claw, when closed, reaching to end of first antennal segment.

Sternites quadrate, caudal margin of the anterior ones projecting slightly and displacing the inter-calary sternites. Sternal pores present in small sub-circular area behind the middle of segments 2-17, on the eighteenth the area is divided by a median band of polygonal plates into two areas which fade out by the 28th. Anal sternite (fig. 10) not quite as broad as long, narrow posteriorly, angles scarcely rounded, the posterior third with a dense pubescence of short hairs. Males with last pair of legs slightly thicker and more densely pubescent, but the difference not so marked as in species of *Zelanion*. Anal pores small.

Coxopleure (fig. 10) also with pubescent area meso-caudally, coxopleural pores four below, opening under the sternite.

Besides possessing a dentate median labral piece, this species has stronger armature on the femuroid of the prehensors than have the two Australian species. It is a small, slender species, yellow in colour, with chestnut head.

Distribution: Both Islands. North Island: Parua Bay, Kaipara, Waiwera, Auckland, Manukau Harbour, Clevedon, Hamilton, Koutu (Gisborne). South Island: Mt. Grey, Waipara, Banks Peninsula, Otekaike.

### Order SCOLOPENDROMORPHA.

#### *Key to Families represented in New Zealand.*

Eyes present; tarsi of legs always two-jointed.

Fam. Scolopendridae.

Eyes absent; tarsi of 1st to 19th legs single-jointed.

Fam. Cryptopidae.

The Scolopendromorpha will be treated only in brief key-form in this revision, as the papers containing descriptions of the three species of Scolopendridae (Archey, Trans. N.Z. Inst., Vol. 53) and a detailed treatment of the genus *Cryptops* (Archey, Rec. Cant. Mus., vol. 2) are readily available in New Zealand.

## FAMILY SCOLOPENDRIDAE.

### *Key to New Zealand Species.*

1. Spiracle openings narrow slits running nearly parallel to length of body.
  - i. Ventral spines of femur of anal leg three in number in a single row.
    1. *Cormocephalus rubriceps* (Newport).
  - ii. Ventral spines of femur of anal leg four in number in two oblique rows.
    2. *Cormocephalus violascens* (Gervais).
2. Spiracle openings round or wide oval in shape.
  3. *Otostigmus chiltoni* Archey.

### 1. *Cormocephalus rubriceps* (Newport), 1844.

*Scolopendra rubriceps* Newport, Ann. Mag. Nat. Hist., vol. 13, p. 99, 1844. *Cormocephalus rubriceps* Newport, Trans. Linn. Soc., vol. 19, p. 419, 1845; Pocock, Ann. Mag. Nat. Hist., ser. 6, vol. 11, p. 128, 1893; Archey, Trans. N.Z. Inst., vol. 53, p. 193, figs. 16-18, 1921.

Distribution: North Island of New Zealand, commonest in central and northern areas; Tasmania, New South Wales and Queensland. This species, which occasionally exceeds 15 cm. in length, occurs throughout the North Island; it is quite common in Auckland gardens.

### 2. *Cormocephalus violascens* (Gervais), 1847.

*Scolopendra violascens* Gervais, Insect. Apt., vol. 4, p. 275, 1847. *Cormocephalus violascens* Newport, Trans. Linn. Soc., vol. 19, p. 424, 1845; Hutton, Trans. N.Z. Inst., vol. 10, p. 289, 1878. *C. purpureus* Pocock, Ann. Mag. Nat. Hist., ser. 6, vol. 8, p. 127, 1893. *C. huttoni* Pocock, *ibid.*, p. 128, *C. violascens* Pocock, Willey's Zool. Results, pt. 1, p. 60, 1898. *C. huttoni* Krapelin, Mitt. Mus. Hamburg, Vol. 22, p. 202, 1903. *C. violascens* Archey, Trans. N.Z. Inst., vol. 53, p. 194, fig. 19, 1921.

Distribution: Wellington Province (Kapiti Island, Lower Hutt, Wellington City) and north-eastern portion of South Island (Kaikoura, Hanmer).

### 3. *Otostigmus chiltoni* Archey, 1921.

*Otostigmus chiltoni* Archey, Trans. N.Z. Inst., vol. 53, p. 191, figs. 13-15, 1921.

Locality: Three Kings Island.

*Ethmostigmus platycephalus* Newport, and *E. rubripes* (Brandt) have also been recorded in New Zealand (Archey, T.N.Z.I., vol. 53, p. 192) but only as chance introductions in fruit or other Island commodities.



## FAMILY CRYPTOPIDAE.

## Genus CRYPTOPS Leach.

*Cryptops* Leach, Trans. Linn. Soc., vol. 11, p. 384, 1814.

Key to New Zealand Species of CRYPTOPS.

- A. Tergites with only faintest indications of longitudinal sulci ..... *C. arapuni* Archey.
- B. Tergites with distinct longitudinal sulci.
- I. First tergite with a transverse collar-sulcus anteriorly, and usually with its anterior margin overlapped by the head.
1. Head with submedian sulci ..... *C. spinipes* Pocock.
2. Head without submedian sulci or with only anterior and posterior rudiments of same ..... *C. megalopora* Haase.
- II. First tergite without sharply defined collar-sulcus, always with its anterior margin overlapping the hinder margin of the head.
1. Larger; coxal pores more numerous (to over 100), prosternal margins broad and nearly straight, tergal sulci complete 8-18: formula (3-7), 8-18 (19).
- a. Prosternal margins broader and straighter ..... *C. polyodontus* Attems.
- b. Prosternal margins less broad and slightly convex ..... *C. lamprethus* Chamberlin.
2. Smaller, coxal pores usually less than 80, prosternal margins only moderately broad, and each convex, tergal sulci complete, 6-19: formula (3-5) 6-19 (20).
- a. Coxal pores 30-80, reaching near to caudal margin. Setae of anal legs moderately numerous and fairly large ..... *C. dilagus* Archey
- b. Coxal pores reduced to 30 on restricted oval area, even in large forms. Anal legs with very numerous small spinescent setae.
- C. australis* Newport.

**Cryptops arapuni** Archey, 1922.

Records Cant. Mus., vol. 2, part 2, p. 75, 1922; Archey *ibid.*, vol. 2, p. 210, 1924.

**Cryptops spinipes** Pocock, 1891.

*Cryptops spinipes* Pocock, Ann. Mag. Nat. Hist., ser. 6, vol. 8, p. 156, 1891. *C. setosus*, Pocock, ibid. p. 157. *C. spinipes*, Kraepelin, Mit. Mus. Hamburg, vol. 20, p. 49, 1903; Arkiv. Zool., vol. 10, No. 2, p. 2, 1916; Chamberlin, Bull. Mus. Comp. Zool., vol. 64, p. 4, 1920; Archey, Trans. N.Z. Inst., vol. 53, p. 184, 1921; *C. zelandicus*, Chamberlin, Bull. Mus. Comp. Zool., vol. 64, p. 9, 1920. *C. spinipes*, Archey, Rec. Cant. Mus., vol. 2, p. 211, 1924.

**Cryptops megalopora** Haase, 1887.

*Cryptops megalopora* Haase, Abb. Mus. Dresden, vol. 5, p. 80, 1887; Kraepelin, Mit. Mus. Hamburg, vol. 20, p. 51, 1903; Chamberlin, Bull. Mus. Comp. Zool., vol. 64, p. 4, 1920; Archey, Trans. N.Z. Inst., vol. 53, p. 185, 1921; Archey, Rec. Cant. Mus., vol. 2, p. 213, 1924.

**Cryptops polyodontus** Attems, 1903.

*Cryptops polyodontus* Attems, Zool. Jahrb. Syst., vol. 18, p. 106, 1903; Kraepelin, Mit. Mus. Hamburg, vol. 20, p. 53, 1903; Chamberlin, Bull. Mus. Comp. Zool., vol. 64, p. 8, 1920; Archey, Trans. N.Z. Inst., vol. 53, p. 185, 1921; Archey, Rec. Cant. Mus., vol. 2, p. 214, 1924.

**Cryptops lamprethus** Chamberlin, 1920.

*Cryptops lamprethus* Chamberlin, Bull. Mus. Comp. Zool., vol. 64, p. 4, 1920; *C. pelorus*, Archey, Trans. N.Z. Inst., vol. 53, p. 190, 1921; *C. tokatea*, Archey, Rec. Cant. Mus., vol. 2, pt. 2, p. 13, fig. 3, 1922; *C. lamprethus*, Archey, Rec. Cant. Mus., vol. 2, p. 215, 1924.

**Cryptops dilagus** Archey, 1921.

*Cryptops dilagus*, Archey, Trans. N.Z. Inst., vol. 53, p. 187, fig. 6, 1921; *C. akaroa*, Archey, ibid, p. 188, figs. 7 to 9; *C. ignivia*, Archey, ibid, p. 188, fig. 10; *C. algidus*, Archey, ibid, p. 189, figs. 11 and 12; *C. dilagus*, Archey, Rec. Cant. Mus., vol. 2, p. 216, 1924.

**Cryptops australis** Newport, 1845.

*Cryptops australis*, Newport, Trans. Linn. Soc., vol. 19, p. 408, 1845; Pocock, Ann. Mag. Nat. Hist., ser. 6, vol. 11, p. 129, 1893; Kraepelin, Mit. Mus. Hamburg, vol. 20, p. 58, 1903; Fauna Sudw. Austr., vol. 2, p. 106, 1908; Arkiv. Zool, vol. 10, No. 2, p. 2, 1916; Chamberlin, Bull. Mus. Comp. Zool., vol. 64, p. 8, 1920; Archey, Trans. N.Z. Inst., vol. 53, p. 186, 1921; *C. galidus*, Archey, ibid., p. 186, figs. 4 and 5, 1921; *C. australis*, Archey, Rec. Cant. Mus., vol. 2, p. 218, 1924.

*Distribution of the Species of CRYPTOPS in New Zealand.*

*Cryptops arapuni* is known only from the type locality, Arapuni, Auckland. *C. spinipes* occurs only in Wellington and the South Island, while the closely related *C. megalopora* is from the Auckland Islands. *C. polyodontus* from the Chatham Islands is closely related to *C. lamprethus*, which is common in the North Island and the Marlborough Sounds, while *C. dilagus* and *C. australis* are South Island species, the latter being restricted to the drier region of Canterbury. *C. spinipes* and *C. australis* also occur in Australia.

## Order CRATEROSTIGMOMORPHA.

## FAMILY CRATEROSTIGMIDAE.

## Genus CRATEROSTIGMUS Pocock 1902.

Type, by monotypy, *C. tasmanianus* Pocock, Tasmania.

Pocock, Quart. Journ. Micros. Sci., vol. 45, n. s., p. 418, 1902.

Pocock's complete and detailed description, as well as his full discussion of the systematic position and evolutionary position of this remarkable annectent form, make it unnecessary in this paper to do more than mention the diagnostic characters of genus and species and to quote the reference to the record of its occurrence in New Zealand.

## Genus CRATEROSTIGMUS.

Eyes a single pair of ocelli. Mandibles armed with three rows, each of three, horny teeth and with a membranous lobe with short hairs above these and a dense fringe of longer hairs below. First maxillae with divided coxae and both rami discrete. Second maxillae with coxae (which are separated from one another medianly) divided into endocoxa and enlarged ectocoxa, and with a 4-jointed ramus with terminal claw hidden among long setae.

Prehensors with prosternum and inner margin of femur produced and dentate, trochanter distinct and with penultimate and antepenultimate segments complete as in *Lithobiomorpha*.

Tergites 21 as in *Scolopendra* and sternites 15 as in *Lithobiomorpha*. Tergites 3, 6, 9, 11, 14 and 17 lack sternites, and spiracles lie under tergites corresponding to 3rd, 5th, 8th, 10th, 12th and 14th sternites.

Legs of six segments, the tarsi being undivided except in the 15th, where it is 2-jointed.

Genito-anal opening enclosed within a bivalved sclerite projecting backwards between the last pair of legs.

**Craterostigmus tasmanianus** Pocock.

*Craterostigmus tasmanianus* Pocock, Quart. Journ., Micros. Science, vol. 45, n.s., p. 423, pl. 23, 1902; Archey, Trans, N.Z. Inst., vol. 49, pp. 319-320, 1917.

Colour, alive, greenish-brown; in spirit yellowish-brown anteriorly and posteriorly rather darker.

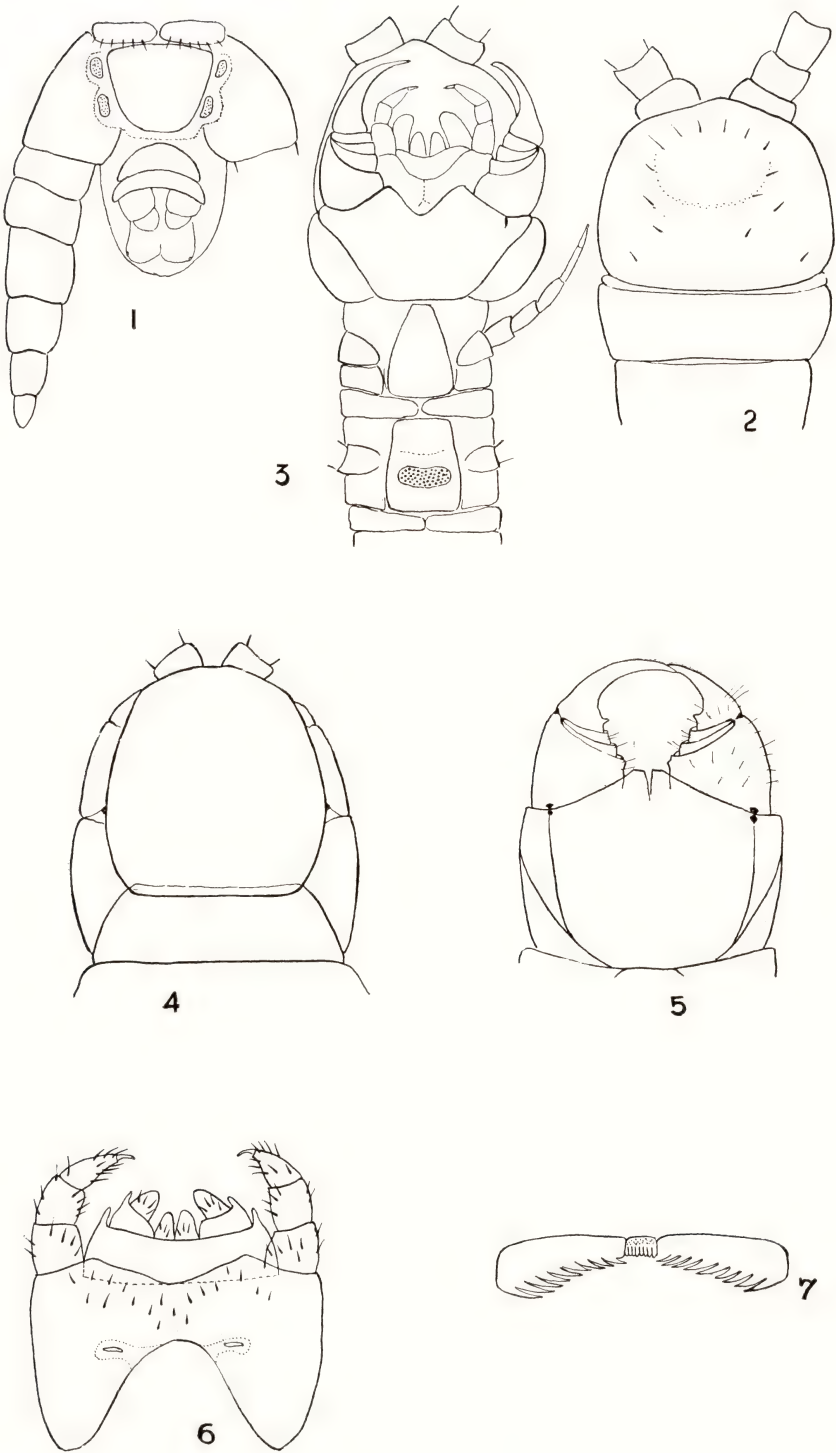
Antennae with 18 joints.

Head with parallel sides and rounded anterior and posterior margins, frontal sulcus distinct, eyes lying just behind it on lateral margin. Tergite of prehensorial segment distinct and pleurite and other prehensor segments all extending well beyond cephalic margin. First tergite large, overlapped slightly by basal plate, but overlapping second tergite. Margins of tergites not emphasized by raised borders or emarginations, but, instead, are almost straight, though antero- and postero-lateral angles are somewhat rounded. Tergites and sternites not grooved and only slightly punctured.

Legs short; tibia and tarsus below with a single spine. Claw with two basal spines; trochanter of 13th and 14th, and coxa of 15th leg with an acute spine. Genito-anal opening lies in a depression surrounded by 8 glandular masses lying within the bivalved genito-anal sclerite.

Distribution: Tasmania (Mount Rumney); New Zealand, South Island only. Picton, Cass, Mt. Grey, Mt. Algides, Routeburn, Mt. Dick, Lake Wanaka, The Remarkables. I have collected this species myself only at Mt. Grey, North Canterbury, where it was found not in slightly damp situations, under stones and logs, as with most other centipedes, but under stones near the edge of a stream in very wet situations.

Examination of a cleared specimen showed non-anastomosing tracheae as in *Anamorpha*. The pleural tegumentary folds were clearly revealed in this preparation, and Pocock's conclusion that the tergites whose sternites and legs have been excalcated are the 3rd, 6th, 9th, 11th, 14th and 17th is confirmed.



Figs. 1-3. *Ballophilus hounselli*, n. sp.  
 Figs. 4-7. *Geophilus spenceri* (Pocock).

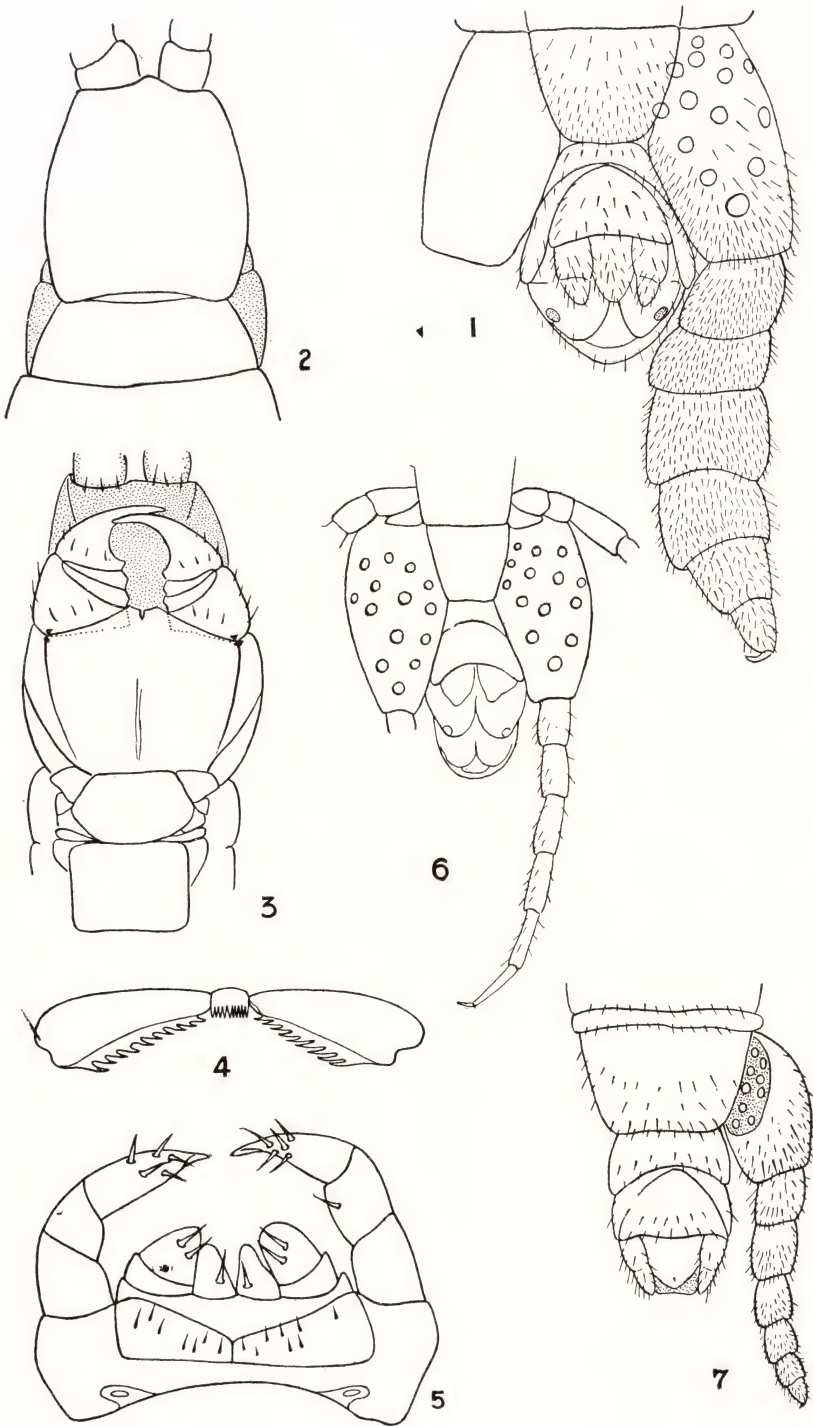
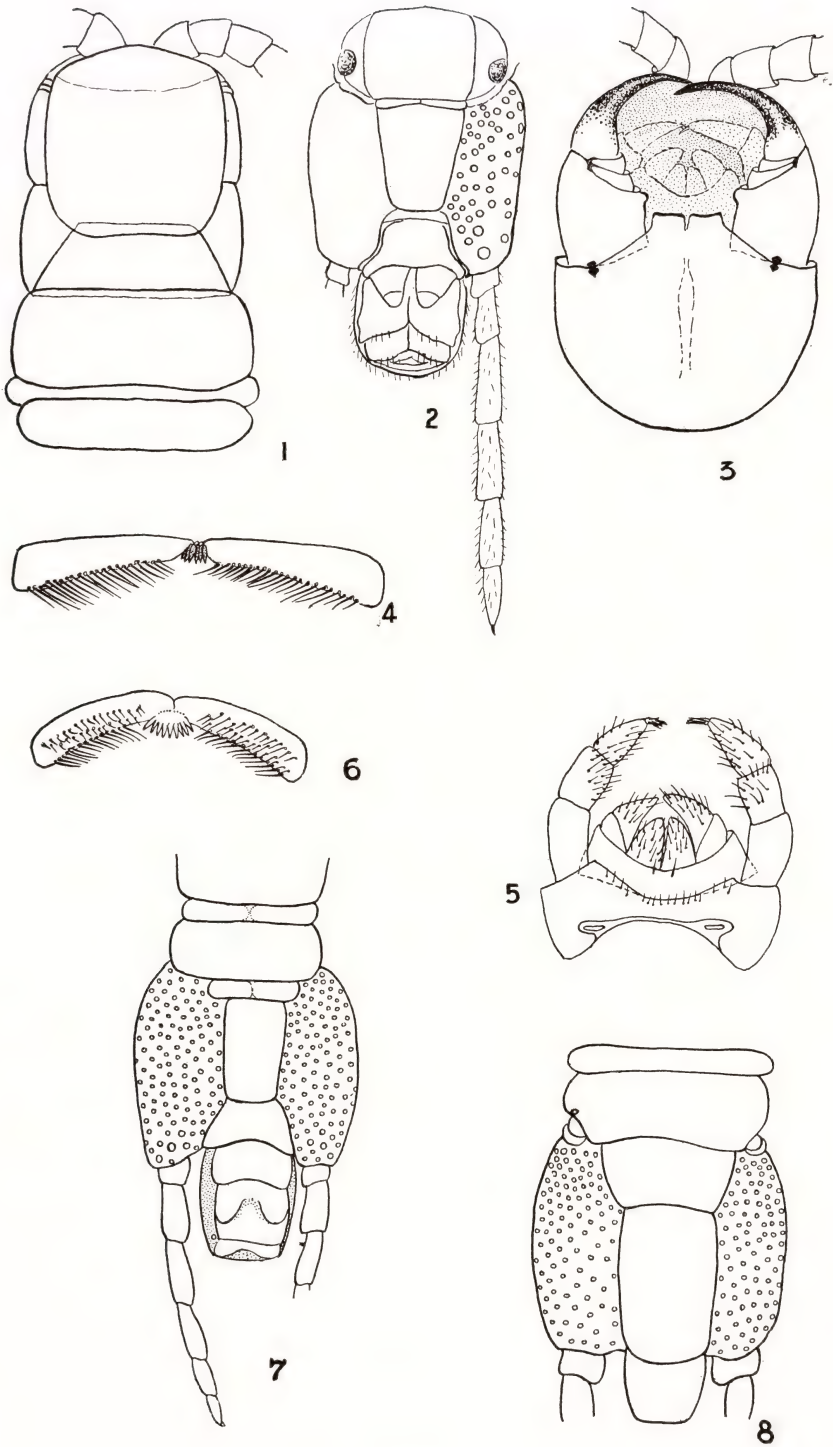
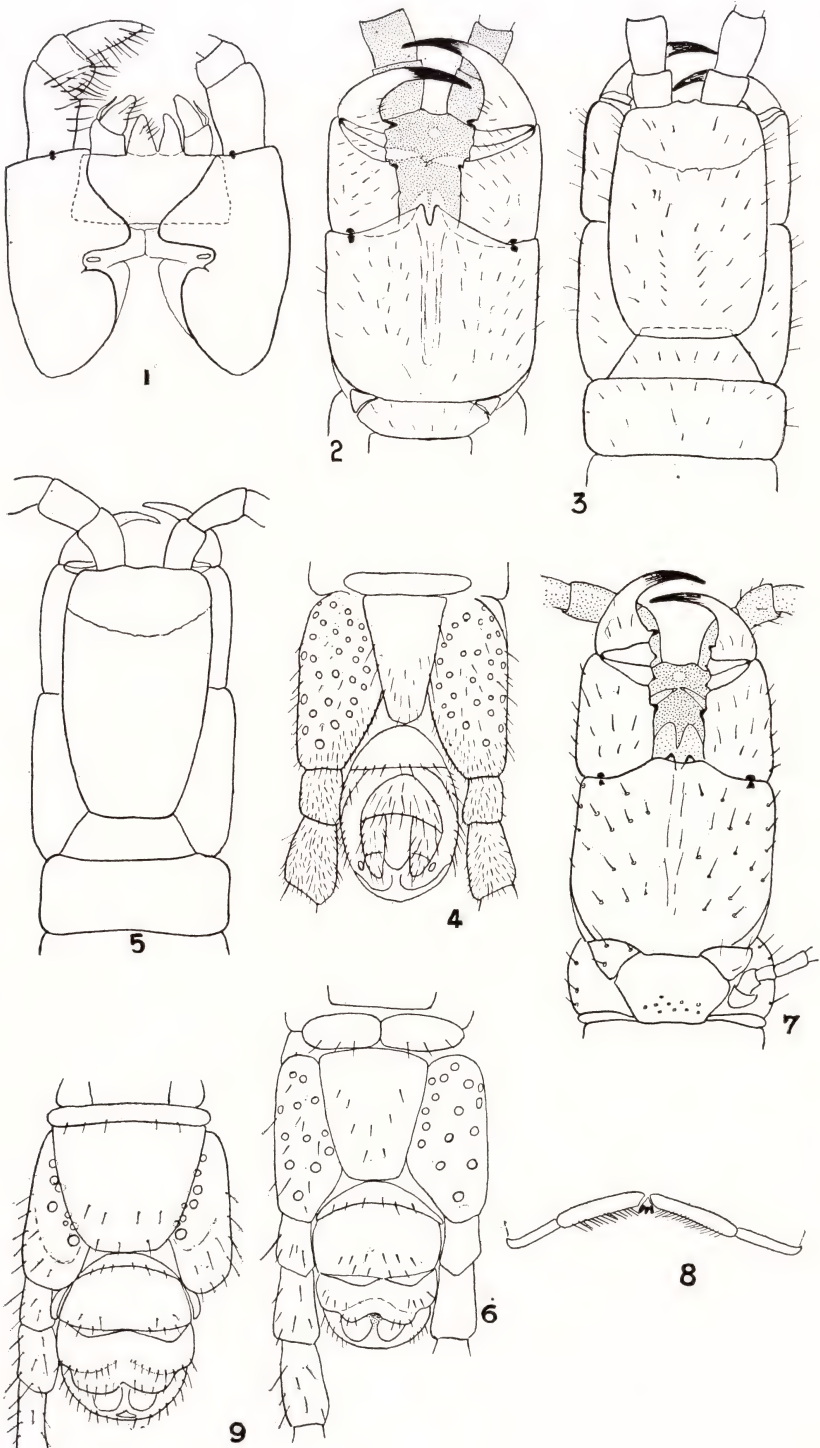


Fig. 1. *Geophilus spenceri* (Pocock).  
 Figs. 2-6. *Geophilus zygethus* (Chamberlin).  
 Fig. 7. *Geophilus xylophagus* Attems.

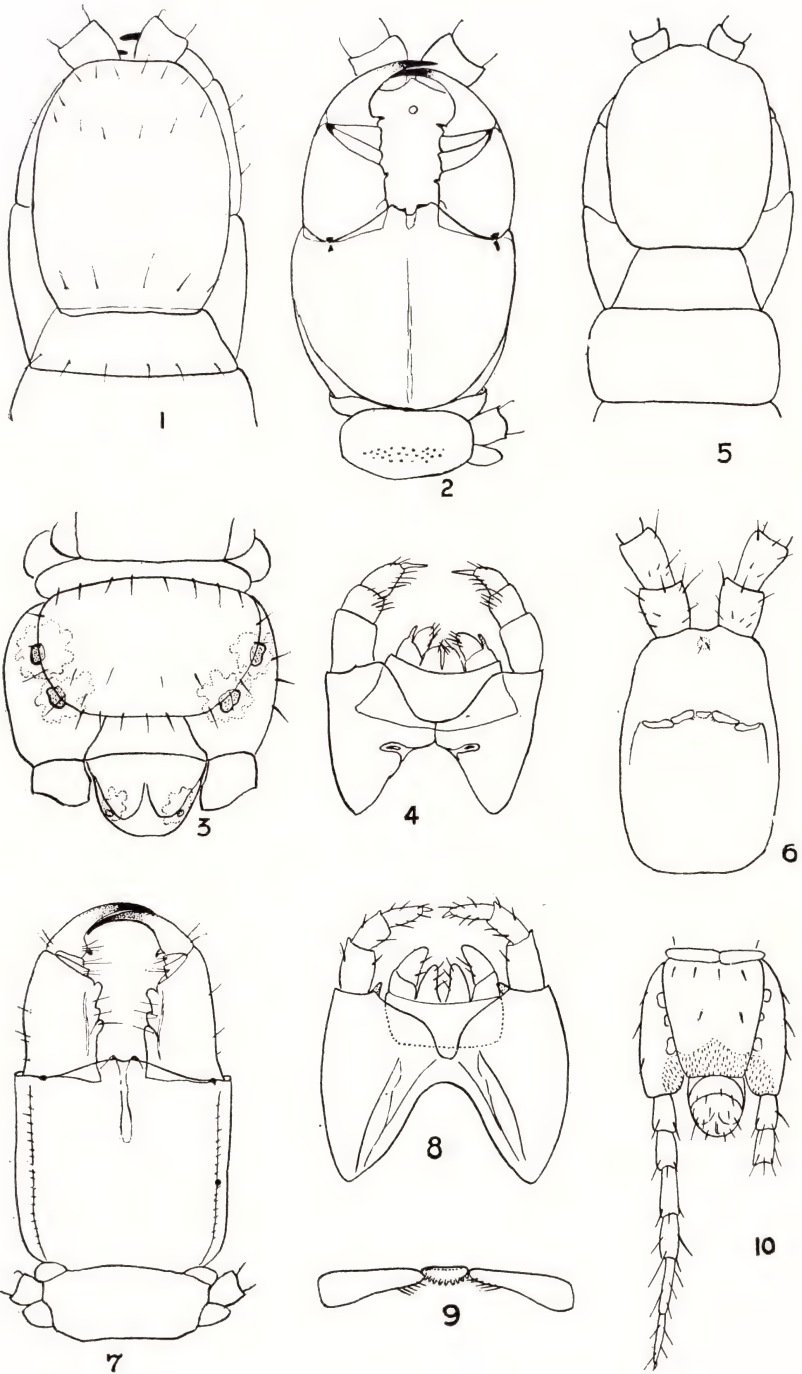


Figs. 1-5. *Zelanoophilus provocator* (Pocock).  
 Figs. 6-8. *Zelanoophilus ferrugineus* (Hutton).



Figs. 1-4. *Zelanion dux* Chamberlin.  
 Figs. 5-8. *Zelanion antipodeus* (Pocock).  
 Fig. 9. *Zelanion morbosus* (Hutton).





Figs. 1-4. *Maoriella macrostigma* Attems.  
 Fig. 5. *Maoriella zelanicus* (Chamberlin).  
 Figs. 6-10. *Schizoribautia brittini* Archey.